State of North Dakota
Information Technology Department

Project Business Case
Second Data Center (MDU) Project

Prepared by: Larry Lee
Project Manager
Information Technology Department

Date of publication: May 19, 2005

TABLE OF CONTENTS

Project Description

On July 30, 2002, Governor Hoeven issued a directive to all state agencies requiring them to develop a continuity of operations plan to ensure the continuity of state government in the event of a manmade or natural disaster.

As a result of this directive, the State of North Dakota purchased a disaster recovery planning tool called the Living Disaster Recovery Planning System (LDRPS). State agencies are currently using LDRPS to identify their disaster recovery requirements, including recovery point objectives and recovery time objectives.

ITD is unable to meet the recovery objectives of state agencies. To meet them, ITD must make fundamental changes to how it provides day-to-day services and disaster recovery. Factors causing the inability to meet objectives include distance from traditional hotsites and having all processing capability concentrated in a single data center.

The objective of the Second Data Center Project (a.k.a. MDU Location) is to develop an alternate processing capability for the state should ITD's main data center become inoperable. This will allow ITD to meet the disaster recovery objectives of the agencies and subsequently meet the requirement of Governor Hoeven's directive.

Business Need / Problem

In October, 2002, Denver Solutions Group issued The Backup/Disaster Recovery Solution, Rationale and Cost Allocation Report. In April, 2004, Hewlett-Packard Solutions issued the Storage Infrastructure Assessment. The results of the two studies, which were delivered to ITD, contained the following two findings:

1. On behalf of the State of North Dakota, ITD houses and supports the infrastructure for critical business functions. Many of these functions involve public safety and require continuous access. The functions include:
    - Health Department – Health Alert Network (HAN); Amber Alert System
    - Division of Emergency Management – National Law Enforcement Telecommunications System (NLETS)
    - Human Services – Child Safety Program; Medicare/Medicaid (MMIS); FACSES; Technical Eligibility (TECS)
    - Attorney General – Criminal Justice Information Sharing (CJIS)
    - Department of Transportation – Drivers License (DLTS); Motor Vehicle System
    - Highway Patrol – Citations; RMS; Contacts; Mobile Data Terminal
2. The traditional disaster recovery solution in use by ITD, which includes access to a hotsite, does not satisfy the recovery time objective of the critical business functions. Recovery cannot be guaranteed in less than 72 hours. A feasible disaster recovery

solution for those functions must guarantee a recovery time objective within 24 hours.

The studies also made the following three recommendations:

1. Establish a centralized backup storage facility for data.
2. Develop a backup network and recovery capability, including the implementation of dual-fabric SAN architecture, the purpose of which is to provide high availability, reliability, backups, and disaster recovery.
3. Create state independence by establishing a second data center that can be shared by a combination of the following state and local entities: ITD, State Universities, Workers Compensation, Job Service, Department of Transportation, Highway Patrol, National Guard, Health Department, Emergency Management, and others.

ITD's Second Data Center Project addresses each of the findings and recommendations with specific projects.

The first recommendation, "Establish a centralized backup storage facility," addresses the need for ITD to change its server backup/recovery process. ITD is working with state agencies to achieve this goal.

The second recommendation, "Develop a backup network and recovery capability," addresses the need for ITD to provide high availability coverage for its critical systems.

Establishing a recovery capability is closely tied to the third recommendation to establish independence. The third recommendation, "Establish state independence by establishing a second data center," is critical to meeting the requirements for disaster recovery and availability identified in the second finding.

These recommendations are being incorporated into the Second Data Center Project. This is necessary to establish an environment with adequate disaster recovery protection and availability.

State agencies are currently developing comprehensive disaster recovery plans using the LDRPS software purchased by Risk Management. These plans enable agencies to quickly respond to a disaster. ITD must be able to support those agencies during a disaster by providing access to the applications that support their critical business functions.

Proposed Solution

The current ITD environment consists of one primary data center that houses the vast majority of IT equipment. Two other minor data centers exist that house specific systems. This plan calls for eliminating those minor data centers and consolidating their functions between the primary data center and the second data center.

The two minor data centers are located in the Department of Transportation (DOT) basement and the Dakota Carrier Network (DCN) basement. The DOT basement data center houses equipment that supports Department of Human Services business functions. The DCN basement data center houses ITD-owned networking equipment.

To recover the critical business functions within their recovery time objectives, ITD must develop a second local data center. A second local data center will allow ITD to recover more quickly by eliminating most travel time, which consumes a large part of the recovery time objective. This overcomes the distance barrier ITD now faces. The second data center will house failover and clustered equipment.

To make its current plan adequate, ITD must spend substantially more money on network connectivity and a server replacement strategy. Since the second data center uses ITD's existing network, ITD can eliminate the connection fees required to connect to the hotsite. Having servers in two separate sites reduces the amount of money ITD must spend to develop a server disaster recovery plan.

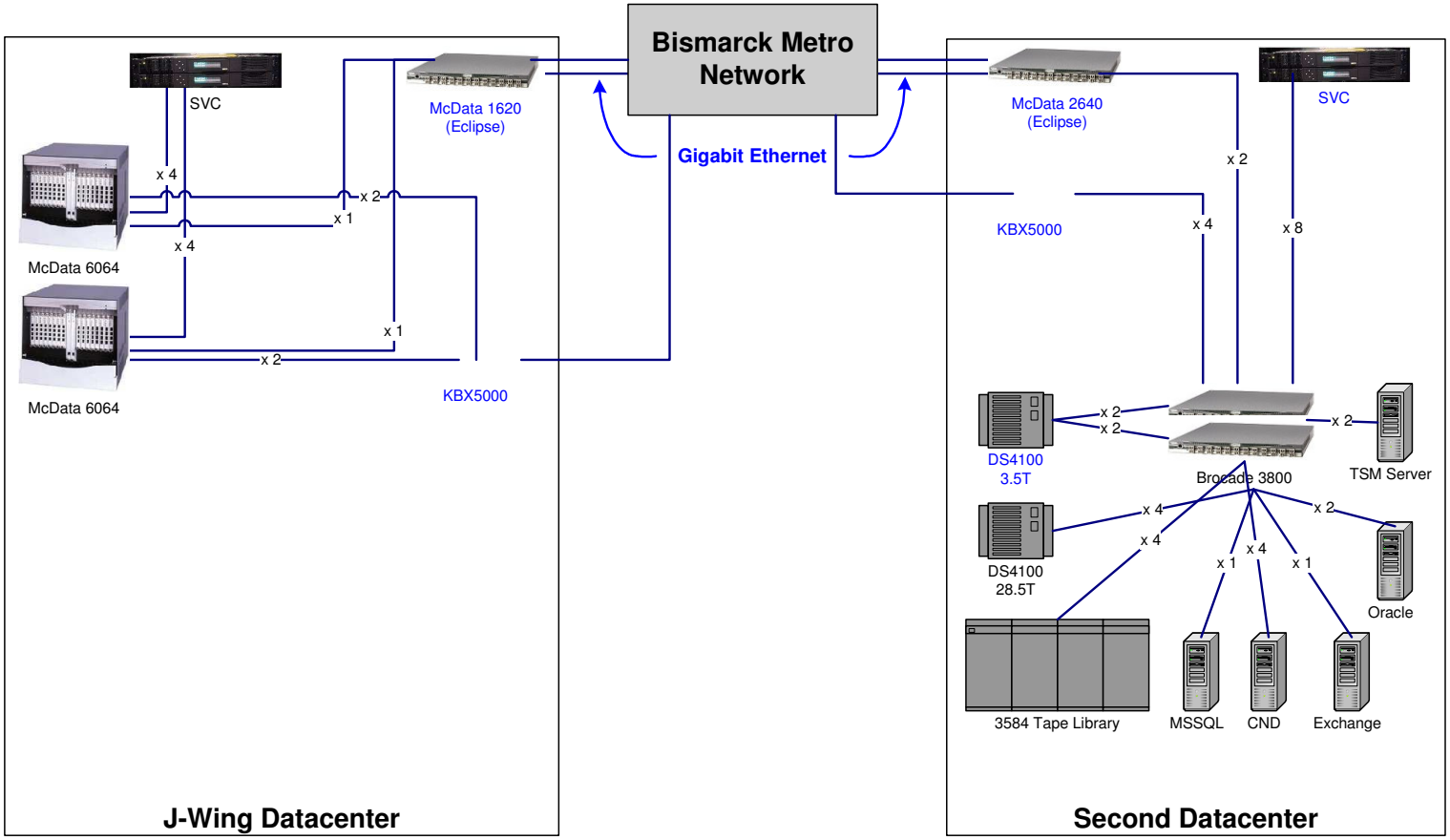
The successful implementation of this project will afford ITD the opportunity to meet its disaster recovery requirements in a cost effective manner. ITD can potentially eliminate its hotsite disaster recovery contract and use those funds to support the second data center.

ITD's approach to the second data center project is to establish an additional data center that works in conjunction with its current primary data center, located in the Judicial Wing of the Capitol Building. The second data center could be located within the cities of Bismarck or Mandan.

This project consists of obtaining the following services and equipment:

- Access to a second data center via a rental agreement.
- Telecommunications equipment to connect ITD's primary data center and second data center.
- Telecommunications circuits to connect the primary data center and second data center.
- Storage equipment to provide backup of critical data and 24/7 availability.
- Establishment of a data storage area at the second data center

The diagram on the next page identifies the potential relationship between the primary and second data centers.


Bismarck Metro Network
Gigabit Ethernet
SVC
McData 1620 (Eclipse)
McData 6064
McData 6064
x 4
x 2
x 1
x 4
x 1
x 2
KBX5000
J-Wing Datacenter
McData 2640 (Eclipse)
SVC
x 2
KBX5000
x 4
x 8
DS4100 3.5T
x 2
x 2
Brocade 3800
x 2
TSM Server
DS4100 28.5T
x 4
x 4
x 4
x 1
x 1
x 2
Oracle
3584 Tape Library
MSSQL
CND
Exchange
Second Datacenter

Alternatives Considered

Alternative #1: Reciprocal Agreements

Pro's of this Alternative: Costs for maintaining this method are usually lower than a traditional hotsite and an in-house second site. The partner is usually closer than the nearest hotsite.

Con's of this Alternative: The problems associated with this alternative include finding a suitable partner and maintaining hardware/software platforms that are suitable to the partner. Adequate excess capacity must be maintained at both partner's sites. The partners must coordinate upgrades in hardware and software to ensure compatibility.

Why Not Chosen: Reciprocal agreements are difficult for both parties to maintain. Before upgrading hardware and software, the upgrades must be acceptable to the other party, thereby causing the upgrades to be difficult to achieve. Each site must also maintain more excess capacity than normal. It is also ITD's belief that an adequate partner is not available in the state of North Dakota. Reciprocal agreements can work for very specialized pieces of equipment, but not enterprise wide platforms.

Alternative #2: Traditional Hotsites

Pros of this Alternative: Hotsite vendors typically have a large variety of equipment from which to choose.

Cons of this Alternative: The cost of a hotsite agreement is high. In addition, the money spent for hotsite access guarantees its use only for testing and at time of disaster.

Why Not Chosen: ITD's current methodology actually includes using a hotsite. However, hotsites require the state of North Dakota to spend large amounts of money just to establish a basic connection to the site. In addition, the hotsite capability is not usable for any purpose other than disaster recovery. Hotsite coverage capable of meeting ITD's needs will exceed $25,000 per month.

The hotsite solution currently in use by ITD does not meet the RTO and RPO requirements as set forth by ITD's customers.

Consistency / Fit with ITD's Mission

ITD's mission includes assisting customers in achieving their mission through the innovative use of information technology. Agencies cannot achieve their missions without reliable and consistent computer availability.

This project increases the reliability and availability of ITD services, thereby helping agencies achieve their missions.

Anticipated Benefits

By distributing clustered equipment between the primary and second sites, ITD can increase the availability of the services that equipment provides. Maintenance at one site can take place while the other site handles the workload. Currently, ITD must shut down the entire service for a period of time to perform maintenance. This will no longer be necessary. The scheduling of planned outages will be easier, since ITD will no longer have to work around peak usage periods for customers.

In the event of a disaster, ITD can cut the recovery time by restoring locally, thus meeting the recovery time objective of its customers. Travel to states such as Colorado and New Jersey will no longer be necessary. ITD will also be able to cancel its existing disaster recovery contracts, thereby freeing up funds to support the second data center.

Data can be sent to the second site on a regular basis, thereby reducing the recovery point objective required by ITD's customers. Currently, data loss of over 10 days can take place depending on the time of disaster. This will be reduced to less than 24 hours in some cases.

All state agencies will benefit from this project by being the recipients of a faster, more reliable, and more comprehensive disaster recovery capability, as well as having access to systems with less downtime. ITD will benefit by being able to provide true 24/7 availability for critical systems, something it cannot currently provide.

If ITD does not implement this project, it must then upgrade its current disaster recovery capability. Adequate network connectivity to the hotsite must be added, along with a capability to restore up to 150 servers. The cost of adding this extra coverage will exceed $25,000 per month.

Cost Estimate

ONE TIME COSTS – SAN EXTENSION / OTHER EQUIPMENT			
Quantity	**Description**	**Unit Cost**	**Total Cost**
9	Power distribution unit	$900	$8,100
9	KVM & cabling	$500	$4,500
4	Kashya KBX5000	$27,500	$110,000
2	Brocade 3800	already own	$0
1	DS4100 initial unit	$21,375	$21,375
9	Server racks	$1,147	$10,323
	Total One-Time SAN Extension / Other Costs:		**$154,298**
ONE TIME COSTS – EXCHANGE			
2	HP ProLiant DL 380	$2,500	$5,000
2	Intel X3.4 GHz 1MB 380/380 G4	$750	$1,500
4	HP 2GB REG PC2-3200	$700	$2,800
4	HP 36.4 GB Hard Drives	$200	$800
2	MS Exchange server software	$3,884	$7,768
2	MS Windows server std	$698	$1,396
	Total One-Time Exchange Costs:		**$19,264**
ONE TIME COSTS – REMODELING / ELECTRICAL			
1	Suspended ceiling (1,200' sq.)	$4,000	$4,000
1	Raised floor (1,200' sq.)	$25,000	$25,000
1	Air conditioning unit	$30,000	$30,000
1	UPS system	$30,000	$30,000
1	Rewiring / remodeling the facility	$40,000	$40,000
1	Power requirements	$30,000	$30,000
1	Hardware costs	$25,000	$25,000
1	Cleaning / demolition	$3,500	$3,500
1	Interior wall remodeling	$5,000	$5,000
1	Bathroom	$5,000	$5,000
1	Ramp / steps	$8,000	$8,000
1	Cardkey reader system	$3,000	$3,000
1	Lighting	$4,000	$4,000
1	Ducting / pipe removal	$4,000	$4,000
1	Upgrade doors	$3,000	$3,000
1	Miscellaneous labor	$40,000	$40,000
	Total One-Time Remodeling/Electrical Costs:		**$259,500**
ONE TIME COSTS – PERSONNEL			
1	Professional consulting services	$8,000	$8,000
730	Personnel costs (hours)	$56	$40,880
	Total One-Time Remodeling/Electrical Costs:		**$48,880**

ONE TIME COSTS – NETWORK			
6	Catalyst 3750 and support equipment	$8,666	$51,996
4	GBIC cards	$2,500	$10,000
1	48 port switch	$10,000	$10,000
2	WDM equipment	$750	$1,500
		Total One-Time Network Costs:	**$64,496**

Total One-Time Costs

Total One-Time SAN Extension / Other Equipment Costs:	$154,298
Total One-Time Exchange Costs:	$19,264
Total One-Time Remodeling / Electrical Costs:	$259,500
Total One-Time Personnel Costs:	$48,880
Total One-Time Network Costs:	$64,496
TOTAL ONE-TIME COSTS:	**$546,438**

ONGOING COSTS – MAINTENANCE / NETWORK / SITE			
Quantity	**Description**	**Interval**	**Total Cost**
4	Telephone	Monthly	$200
1	Electrical Power Cost	Monthly	$1,130
4	Fiber circuits ($700 each)	Monthly	$2,800
1	Site Rental (1,800' sq X $13 / 12 months)	Monthly	$1,950
		TOTAL ONGOING COSTS:	**$6,080**

At this time, the costs of the project are directly related to the following areas:

- Employee time and labor requirements
- Additional hardware, software, and network resources specifically required for this project, and not being obtained for other current projects
- Upgrades to current hardware, software, and network resources specifically required for this project
- Rental costs for the second site

These costs will be estimated in the implementation project plan, and the procedures for tracking costs will also be included in the project plan.

Additional funding for the project will come from legislative funding requests and the existing ITD billing process.

Cost/Benefit Analysis

It must be stated that this project is not a cost savings endeavor. It's purpose is to provide better availability for critical systems, including some involving the safety of people. If successful, ITD's liability for non-performance during a disaster will be mitigated. However, this project will allow ITD to recoup some costs it now pays for disaster recovery sites. The following chart shows costs that can be eliminated:

Cost Reduction	Monthly Cost
Elimination of Hotsite Mainframe Contract	$5,083
Elimination of Hotsite AS/400 Contract	$1,512
Elimination of Hotsite Network Contract	$2,154
Elimination of Disaster Recovery Circuit Contract	$2,374
Anticipated Circuit Upgrade Additional Cost (1)	$5,976
Redirection of Funds to Cover Small Systems (2)	$19,950
Total Anticipated Monthly Savings:	**$37,049**
(1) based on price quote received from DCN for a DS3 circuit. (2) based on price quotes for E-mail ($1,400), Oracle Database ($2,800), and Intel based platforms ($175 per server times 90) Other costs based on current or soon to expire disaster recovery contracts.	

Most of the anticipated savings will come from elimination of monthly disaster recovery fees. The second data center will serve as an alternate site for critical applications. With a second data center, ITD can avoid the cost of enhancing its current recovery plan. The current plan does not cover small systems. If a second data center is not developed, ITD must add to the monthly disaster recovery fee to cover these systems.

ITD supports some business functions that provide for the safety of people. One such system permits Highway Patrol officers to check on the status of vehicles. Should ITD not be able to support this function, the safety of the officers is compromised.

ITD supports several financially based business functions for state agencies. The following table shows examples of the financial impact to the Department of Human Services should ITD not be able to provide service:

DHS Business Function	Financial Impact 24 Hours	Financial Impact 48 Hours	Financial Impact 72 Hours
Contracts System	$400,000	$800,000	$1,200,000
ROAP	$68,000	$136,000	$204,000
CCWIPS	$63,000	$126,000	$189,000
AIMS	$200,000	$400,000	$600,000
CCAP	$33,000	$66,000	$99,000
LIHEAP	$25,000	$50,000	$75,000
FACSES	$325,000	$650,000	$975,000
Food Stamps	$110,000	$220,000	$330,000
TANF	$40,000	$80,000	$120,000

Project Risks

Risk ID	Risk	Risk Probability	Risk Impact	Risk Priority	Risk Assignment	Risk Response Plan
1	High cost could negate the feasibility of the project	High	High	1	Larry Lee	As costs become known, alternatives to the original plan should be explored.
2	The high # of questions / variables in the project cause the project deliverables and schedule to slip	Moderate	High	1	Larry Lee	As questions are reviewed and answered, the info produced should be communicated and the project scope, schedule, and costs aligned where necessary.
3	Funding does not materialize	High	High	1	ITD Management	ITD will consider alternatives for the project
4	Distance between data centers slows response time.	Moderate	Moderate	2	Glen Rutherford	As network traffic rises, increases in bandwidth must be explored.
5	The completion of remodeling or fiber is delayed.	Low	High	3	Larry Lee	ITD will work with MDU to determine where slippage is occurring and what can be done about it.
6	ITD is unable to reach a rental agreement for a second data center	Low	High	3	Larry Lee	ITD will explore other potential sites.

Optional Costs

This section lists optional costs and initiatives related to the second data center project.

OPTIONAL ONE TIME COSTS – SAN EXTENSION			
Quantity	**Description**	**Unit Cost**	**Total Cost**
1	McData 1620 Eclipse	$26,784	$26,784
1	McData 2640 Eclipse	$93,326	$93,326
1	IBM SAN Volume Controller	$80,000	$80,000
	Total Optional One-Time SAN Extension Costs:		**$200,110**
OPTIONAL ONE TIME COSTS – z800			
1	IBM 2066 z800 s/390 Processor	$85,000	$85,000
1	3584 Tape Subsystem (1 frame)	$20,000	$20,000
1	IBM 390 Capable Tape Controller	$65,000	$65,000
4	3584 Tape Subsystem 3592 JAG Drives	$25,000	$100,000
1	3584 Tape Media 100 3592 JAG Tapes	$13,000	$13,000
	Total Optional One-Time z800 Costs:		**$283,000**
OPTIONAL ONE TIME COSTS – NETWORK			
2	Carrier class routers	$100,000	$200,000
	Total Optional Network Costs:		**$200,000**
	TOTAL OPTIONAL ONE-TIME COSTS:		**$683,110**

The following costs indicate optional ongoing costs, for platforms such as the z800.

OPTIONAL ONGOING COSTS			
Quantity	**Description**	**Interval**	**Total Cost**
1	z800	Monthly	$1,800
1	CBU (Capacity Backup Upgrade)	Monthly	$1,250
	Total Optional On-Going Costs:		**$3,050**

NOTE: the following costs are independent of the second data center project and are listed here only as a reference.

ONE TIME COSTS – TSM AND TAPE SYSTEM			
Quantity	**Description**	**Unit Cost**	**Total Cost**
1	3584-L52	$54,626	$54,626
1	3584-L52 maintenance – 36 month	$9,043	$9,043
1	3584-D52	$18,000	$18,000
1	3584-D52 maintenance – 36 month	$1,496	$1,496
1	3588-F3A (tape drives)	$54,720	$54,720
1	3588-F3A maintenance – 36 month	$15,220	$15,220
1	3589-006	$10,800	$10,800
1	DS4100 1710-10U	$131,188	$131,188
1	DS4100 1710-10U maintenance – 36 month	$14,994	$14,994
1	1724-100	$27,251	$27,251
1	1724-100 maintenance – 36 month	$5,447	$5,447
1	Implementation service	$30,000	$30,000
1	TSM license cost	$49,173	$49,173
Total One-Time TSM and Tape System Costs:			**$421,958**